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(19)



## (54) FLOW CONTROL VALVES

(71) We, MUCON ENGINEERING COMPANY LIMITED, a British Company, of Winchester Road, Basingstoke, Hampshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to flow control valves of the kind comprising two or more rings in adjacent co-axial relation, and a flexible open-ended sleeve folded back on itself and attached to the rings in such manner that relative rotation between one of the rings and the other ring or rings causes the sleeve to be twisted to present a single or multiple sealing diaphragm. In such valves having two rings, for example, the sleeve is attached to the rings at its ends so that in the open position the sleeve forms a double-walled tube through which material flow to be controlled by the valve takes place, and in the closed valve position when the rings are relatively rotated, the sleeve forms a single diaphragm extending tightly across the rings and stopping the material flow therethrough.

In order to protect the valve sleeve against wear caused by the material flow when the valve is open, it has been past practice to incorporate a flexible liner tube which lies within the valve sleeve, the tube wall being squeezed together to cut off the material flow through it when the sleeve is twisted on valve closure. Heretofore such a liner has been formed as a part of the valve independent of the sleeve and rings, a construction involving securing means additional to the basic components involved in mounting the rings and sleeve in a valve body.

It is the object of the present invention to provide a liner for a flow control valve which avoids the necessity of providing such additional parts.

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In accordance with the invention there is provided a combined valve sleeve and liner comprising a flexible open-ended tube having at least two rings secured thereto in spaced-apart parallel relation, one of the rings being adjacent one end of the tube and the other of the rings being intermediate the tube ends such that rotation of the rings relative to each other through 180° will produce an iris diaphragm closure or closures between them and the remaining free length of tube is sufficient to provide a wear resistant liner when folded back through that part of the tube between the rings.

When the combined sleeve and liner is installed in a valve the rings are located in adjacent relationship, the length of tube between them being folded back on itself to form the valve sleeve and the remaining portion of the tube being arranged within the sleeve to form the liner.

The rings are mounted in a valve body such that one of the rings is fixed and the other rotatable to close and open the valve by twisting the sleeve, suitable operating means being provided.

The invention may include a double sleeve construction in which case three rings in spaced-apart parallel relation are fixed to the flexible tube, one ring being at one of the tube ends and the other two rings intermediate the tube ends. In such a case the free length of tube must be of sufficient length to ensure that the liner extends entirely through the double sleeve of the valve when the valve is opened.

Most conveniently the tube is made of a rubber composition or fibrous material, the rings, which are of metal, being attached to the tube by stitching, heat sealing or other means.

Embodiments of the invention, by way of example, are illustrated in the accompanying drawings in which:—

90

Figure 1 shows a perspective view of a combined sleeve and liner according to the invention in an "extended" form,

Figure 2 shows a similar view of the sleeve and liner in a "folded" form,

Figure 3 shows a section of the sleeve and liner as located in a valve body, the valve body being omitted for clarity, and

Figure 4 shows a similar view to Figure 3 of a three ring, double-sleeve embodiment of the invention.

Referring to Figure 1 the sleeve and liner shown therein comprises a flexible tube 1 of synthetic plastics or a rubber composition to which are secured two spaced-apart valve rings 2, 3, the ring 2 at one of the tube ends and the ring 3 intermediate the ends. Each ring is retained in an annular pocket formed by folding the tube and securing the folded over portions together by stitching or adhesive. The ring spacing is such that when the portion 5 of the tube which forms the liner is folded over to hang from the ring 3 inside the sleeve it extends beyond the ring 3 as shown in Figure 2.

Figure 3 shows the arrangement of the sleeve and liner in a typical valve body. The rings, 2, 3 are clamped within the valve body around the valve orifice and in adjacent relationship so that the portion 4 forms a double-walled tube around the upper part of the liner. The ring 3 is fixed and when the ring 2 is rotated to close the valve the portion 4 is twisted to form a diaphragm closure 4 gripping the liner within it as shown at 5a to close the valve.

In Figure 4 a combined double sleeve and liner is shown in its position within a valve body (not shown). A tube 11 is provided with three spaced apart rings 12, 13, 14 the ring 12 being at one end of the tube. Portions 16 and 17 of the tube between the rings 12 and 13, and 13 and 14, respectively form the double walled valve sleeves which are twisted when the ac-

tuatable ring 13 is rotated relative to the fixed rings 12, 14 to form closing diaphragms 16a, 17a around the end portion 15 of the tube which hangs through the sleeves and is deformed as shown at 15a on closure.

#### WHAT WE CLAIM IS:—

1. A combined valve sleeve and liner for a flow control valve comprising a flexible open ended tube having at least two rings secured thereto in spaced-apart parallel relation, one of the rings being adjacent one end of the tube and the other ring or rings being intermediate the tube ends such that rotation of one or more of the rings relative to the remaining ring or rings about a common axis and through 180° will produce an iris diaphragm closure or closures between them, the remaining free length of the tube being sufficient to provide a wear resistant liner when folded back through that part of the tube extending between the rings.

2. A combined valve sleeve and liner according to claim 1 in which the tube is made of a rubber composition and the rings are of metal.

3. A combined valve sleeve and liner according to claim 1 in which the rings are attached to the sleeve by stitching or sticking together folded over portions of the sleeve enclosing the rings.

4. A combined valve sleeve and liner constructed and arranged substantially as hereinbefore described and shown in the accompanying drawings.

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FIG. 1.

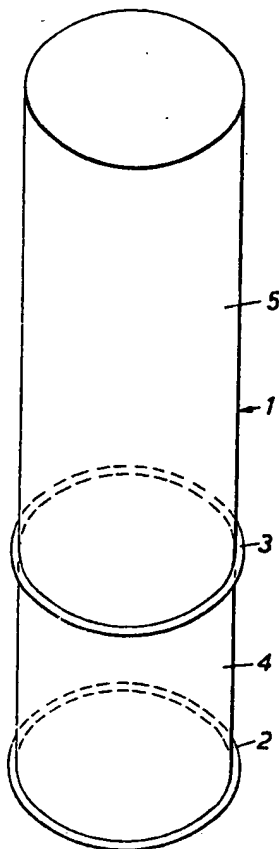


FIG. 2.

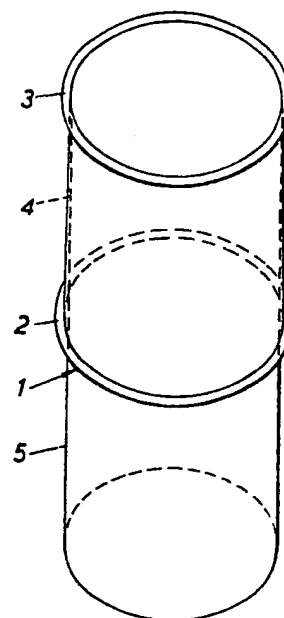
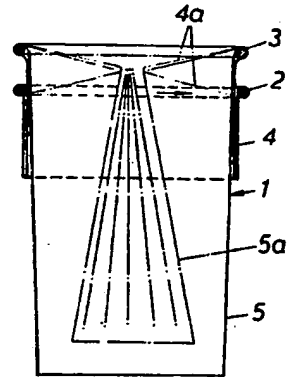


FIG. 3.FIG. 4.